AMENDMENTS TO THE CLAIMS

Listing of claims:

1. (Currently Amended) A method of producing monoolefins, comprising:

(a) contacting an olefin stream with a polar solvent **and a high boiling additive** such that a highly unsaturated hydrocarbon in the olefin stream becomes dissolved in the polar solvent **and the high boiling additive**; and

(b) contacting the polar solvent **and the high boiling additive** with a hydrogenation catalyst comprising palladium and silver in the presence of hydrogen at conditions effective to hydrogenate the highly unsaturated hydrocarbon to a monoolefin,

wherein the polar solvent comprises a compound selected from the group consisting of N-methylpyrrolidone, formamide, N-methylformamide, N-ethylformamide, N-phenylformamide, N,N-dimethylformamide, N,N-diethylformamide, N,N-diphenylformamide, sulfolane, n-formyl morpholine, glycerol, triethylene glycerol, tetraethylene glycerol, and combinations thereof.

2. (Original) The method of claim 1, wherein step (b) comprises feeding both the olefin stream and the polar solvent having the highly unsaturated hydrocarbon dissolved therein to a hydrogenation reactor.

3. (Original) The method of claim 1, further comprising separating the olefin stream from the polar solvent having the highly unsaturated hydrocarbon dissolved therein before performing step (b).

4. (Canceled)

5. (Original) The method of claim 1, wherein a weight ratio of the polar solvent to the highly unsaturated hydrocarbon ranges from about 0.00006 to about 0.15.

6. (Original) The method of claim 1, wherein the olefin stream comprises cracked gas recovered from an ethylene cracker.

7. (Original) The method of claim 1, wherein the olefin stream primarily comprises ethylene separated from cracked gas.

8. (Original) The method of claim 1, wherein the olefin stream primarily comprises propylene separated from cracked gas.

9. (Original) The method of claim 1, wherein the highly unsaturated hydrocarbon comprises a compound selected from the group consisting of an acetylene, a diolefin, and combinations thereof.

10. (Original) The method of claim 1, wherein the highly unsaturated hydrocarbon comprises a compound selected from the group consisting of acetylene, methylacetylene, vinylacetylene, ethylacetylene, 2-butyne, propadiene, butadiene, isoprene, 1-3 pentadienes, cyclopentadiene, and combinations thereof.

11-12. (Canceled)

13. (Previously Presented) The method of claim 1, wherein the hydrogenation catalyst further comprises fluorine.

14. (Currently Amended) The method of claim 1, wherein the ~~further comprising combining a~~ high boiling additive is combined with the polar solvent before said contacting the olefin stream with the polar solvent.

15. (Original) The method of claim 14, wherein a mixture of the polar solvent and the high boiling additive comprises from about 0.0001 to about 10 wt.% of the high boiling additive based on the total weight of the mixture.

16. (Original) The method of claim 14, wherein a mixture of the polar solvent and the high boiling additive comprises from about 0.001 to about 1 wt.% of the high boiling additive based on the total weight of the mixture.

17. (Original) The method of claim 14, wherein a mixture of the polar solvent and the high boiling additive comprises from about 0.01 to about 0.1 wt.% of the high boiling additive based on the total weight of the mixture.

18. (Original) The method of claim 14, wherein the high boiling additive comprises a compound selected from the group consisting of triphenylphosphine, diphenylphosphine, benzothiophene, dibenzothiophene, substituted dibenzothiophenes, pyridine, substituted pyridines, aniline, substituted anilines, alkali metal fluorides, and combinations thereof.

19. (Original) The method of claim 14, wherein the high boiling additive is present in the polar solvent during the hydrogenation.

20. (Original) The method of claim 15, wherein a selectivity to the monoolefin during the hydrogenation is greater than about 30%.

21. (Canceled)

22. (Original) The method of claim 15, wherein a selectivity to the monoolefin during the hydrogenation is greater than about 80%.

23. (Original) The method of claim 1, wherein a molar ratio of the hydrogen to the highly unsaturated hydrocarbon is in a range of from about 0.5 to about 20.

24. (Canceled)

25. (Original) The method of claim 1, wherein a molar ratio of the hydrogen to the highly unsaturated hydrocarbon is in a range of from about 2 to about 5.

26. (Original) The method of claim 1, wherein the highly unsaturated hydrocarbon is acetylene and the monoolefin is ethylene.

27. (Original) The method of claim 1, wherein the monoolefin desorbs from the polar solvent.

28. (Original) The method of claim 27, further comprising introducing the monoolefin to the olefin stream from which the highly unsaturated hydrocarbon has been removed.

29. (Original) The method of claim 1, wherein the monoolefin desorbs from the polar solvent and combines with the olefin stream in situ.

30. (Original) The method of claim 27, further comprising recycling the polar solvent for use in removing the highly unsaturated hydrocarbon from the olefin stream.

31. (Original) The method of claim 14, wherein the monoolefin desorbs from the polar solvent, and further comprising recycling the polar solvent comprising the high boiling point additive for use in removing the highly unsaturated hydrocarbon from the olefin stream.

32. (Original) The method of claim 27, wherein the hydrogenation occurs in a liquid phase and the monoolefin desorbs from the liquid phase into a gas phase.

33. (Original) The method of claim 1, wherein the polar solvent removes all or a portion of any oligomers formed on the hydrogenation catalyst during hydrogenation.

34. (Currently Amended) A method of removing a highly unsaturated hydrocarbon from a hydrocarbon stream, comprising:

(a) extracting the highly unsaturated hydrocarbon from the hydrocarbon stream with a polar solvent **and a high boiling additive, wherein the polar solvent comprises a compound selected from the group consisting of N-methylpyrrolidone, formamide, N-methylformamide, N-ethylformamide, N-phenylformamide, N,N-dimethylformamide, N,N-**

diethylformamide, N,N-diphenylformamide, sulfolane, n-formyl morpholine, glycerol, triethylene glycerol, tetraethylene glycerol, and combinations thereof; and

(b) hydrogenating the highly unsaturated hydrocarbon in the polar solvent to a monoolefin via contact with a hydrogenation catalyst comprising palladium and silver.

35. (Original) The method of claim 34, further comprising separating the polar solvent from the hydrocarbon stream prior to hydrogenation.

36. (Original) The method of claim 34, wherein step (b) comprises feeding both the hydrocarbon stream and the polar solvent to a hydrogenation reactor.

37. (Original) The method of claim 35, further comprising recovering the monoolefin and adding the monoolefin to the hydrocarbon stream.

38. (Original) The method of claim 36, wherein the monoolefin desorbs from the polar solvent and combines with the hydrocarbon stream in situ after step (b), and further comprising separating the polar solvent from the hydrocarbon stream.

39. (Original) The method of claim 35, further comprising recycling the polar solvent for use in step (a).

40. (Original) The method of claim 38, further comprising recycling the polar solvent for use in step (a).

41. (Original) The method of claim 1, wherein the hydrocarbon stream comprises one or more streams from an ethylene cracker.

42-49. (Canceled)

50. (New) A method of producing monoolefins, comprising:

(a) contacting an olefin stream with a polar solvent such that a highly unsaturated hydrocarbon in the olefin stream becomes dissolved in the polar solvent, wherein the polar

solvent comprises a compound selected from the group consisting of sulfolane, glycerol, triethylene glycerol, tetraethylene glycerol, and combinations thereof; and

(b) contacting the polar solvent with a hydrogenation catalyst comprising palladium and silver in the presence of hydrogen at conditions effective to hydrogenate the highly unsaturated hydrocarbon to a monoolefin.

51. (New) The method of claim 50, wherein step (b) comprises feeding both the olefin stream and the polar solvent having the highly unsaturated hydrocarbon dissolved therein to a hydrogenation reactor.

52. (New) The method of claim 50, further comprising separating the olefin stream from the polar solvent having the highly unsaturated hydrocarbon dissolved therein before performing step (b).

53. (New) The method of claim 50, wherein the hydrogenation catalyst further comprises fluorine.

54. (New) The method of claim 50, wherein the monoolefin desorbs from the polar solvent.

55. (New) The method of claim 54, further comprising introducing the monoolefin to the olefin stream from which the highly unsaturated hydrocarbon has been removed.

56. (New) The method of claim 50, wherein the monoolefin desorbs from the polar solvent and combines with the olefin stream in situ.

57. (New) The method of claim 54, further comprising recycling the polar solvent for use in removing the highly unsaturated hydrocarbon from the olefin stream.

58. (New) The method of claim 50, wherein a weight ratio of the polar solvent to the highly unsaturated hydrocarbon ranges from about 0.00006 to about 0.15.

59. (New) The method of claim 50, wherein the olefin stream comprises cracked gas recovered from an ethylene cracker.

60. (New) The method of claim 50, wherein the olefin stream primarily comprises ethylene separated from cracked gas.

61. (New) The method of claim 50, wherein the olefin stream primarily comprises propylene separated from cracked gas.

62. (New) The method of claim 50, wherein the highly unsaturated hydrocarbon comprises a compound selected from the group consisting of an acetylene, a diolefin, and combinations thereof.